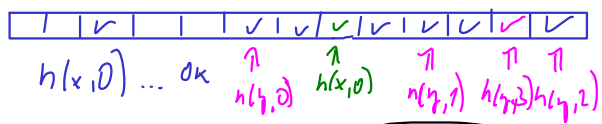


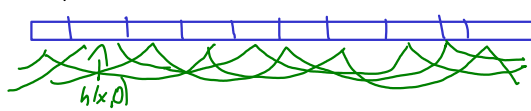
Otvřená adrese

$h(x, i) \in [m]$



Lin. přidávání: $h(x, i) = S(x) + i \pmod m$

1) $h(x, i) = (S(x) + c \cdot i) \pmod m ; c \neq m$

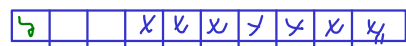


$\exists k \exists d : S(x) + d \cdot i = k \pmod m$

$(c_1 \neq c_2) \Rightarrow S(x) + c_1 \cdot i \neq S(x) + c_2 \cdot i \pmod m$
 $\leq m$

$h(x, i) = h(y, i) \Leftrightarrow (h(x, i)) = (h(y, i))$

$h_1(x, i) = i \pmod m$
 $h_2(x, i) = c \cdot i \pmod m$

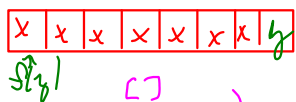
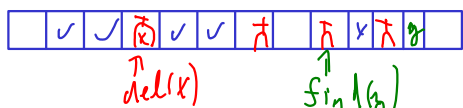


$S(y) = S(x) + 1$



$S(y) = S(x) + c$

2) Delete(x) ... O(1) amort.



- insert(a)
- insert(b)
- insert(c)
- delete(a)
- delete(b)
- delete(c)

$p \dots \# \bar{x}$
 $m \dots \# \text{prvků}$
 $p > m/2$ překopeme má tabulku (velikosti $m/2$)
 $\Rightarrow \geq \frac{m}{2}$ delete, než překopeme
 $\Rightarrow O(1)$ amort na skutečné smazání

4. Bloom Filtery



insert: $B[h(x)] = 1$; Member(x): $B[h(x)] = 1?$

$P_r(B[h(x)] = 1 | x \notin M)$

$I_{x,k} = P_r[h(x) = k] \quad k = h(y)$

$|M| = m$

$y \notin M \wedge \exists x: h(x) = h(y), x \in M$

$\# \text{kolizi} = \sum_{x \in M} I_{x, h(y)}$

$P_r[\# \text{kolizi} \geq 1] = P_r[x_1, k, x_2, k, \dots] \leq \sum_{x \in M} \frac{c}{m}$

$P_r[A \cup B] \leq P_r[A] + P_r[B]$

$A_x = h(x) = h(y)$
 $c \text{-univerzální} \dots \leq \frac{c}{m} \leq \frac{cm}{m^2}$

$m = c \cdot z \cdot m \Rightarrow P_r \leq \frac{1}{z}$

5 k-cestný Merge sort



merge(1, 2, ..., k) v čase $O(\log_k m)$

- najdeme nejmenší prvek v $O(\log_k k)$, použijeme smáče

$T(m) = O(m \log_k k) + k \cdot T(\frac{m}{k})$
 $T(1) = O(1)$
 hloubka ... $O(\log_k m)$

$T(m) = \sum_{i=0}^{\log_k m} k^i \cdot \frac{m}{k^i} \log_k k = \sum_{i=0}^{\log_k m} m \log_k k = \log_k m \cdot m \cdot \log_k k = O(m \log_k m)$

$\frac{\log_k m}{\log_k k}$

